ulceration, and removing the part of the stomach most liable to ulceration reduces the incidence of ulcer to a minimum.

In conclusion, I wish to emphasize that the field of stomach surgery should be restricted to those adept and thoroughly trained. The average doctor may not attempt many operations where there is little danger to the patient's life, but he will sometimes attempt to remove stomach ulcers when lack of efficiency means death to the patient. Lack of skill is responsible for 90 per cent of the accidents of gastric surgery.

I deeply appreciate the discussion of Doctors Hunt, Collins, Rixford, and Thomason; they have added much to this brief presentation.

OSTEOMYELITIS AND SUPPURATIVE JOINTS: SALT WATER POOL TREATMENT*

By A. Brockway, M.D.
Los Angeles

Discussion *by Francis M. McKeever, M. D., Los Angeles; Frederic C. Bost, M.D., San Francisco; Samuel S. Mathews, M. D., Los Angeles.*

THESE two conditions, osteomyelitis and suppurative arthritis, are presented together as one subject because they are closely allied clinically, and are also often associated together as part of the same infection process. However, from the standpoint of treatment, they should be considered as separate clinical entities because, as will be shown later, the fundamental principles underlying their treatment are distinctly different.

Most of the various antiseptic formulae that have been developed have been tried in the treatment of osteomyelitis, but the ideal antiseptic that will destroy bacteria in the living body without harming the tissues has not been found. In osteomyelitis, particularly, such form of treatment is futile, because the solution cannot possibly reach the microscopic limits of the infection.

With the advent of bacteriophage treatment, the medical profession had high hopes that here at last was a form of therapy that would have a direct and beneficial therapeutic effect in osteomyelitis. From a theoretical standpoint this would seem the ideal way to deal with any type of infection; but, in spite of all the theoretical implications, the fact remains that the stubborn course of bone infection has not been greatly altered.

I think the same may be said of maggot therapy. There is no doubt that good results have been obtained with this mode of treatment, and the same may be said of other forms of treatment in use. Many cases of osteomyelitis, either because of the low virulence of the organism or the high resistance of the host, tend to be a self-limiting disease and eventually get well. However, acute bone infections remain one of the most intractable conditions that the surgeon is called upon to treat.

The fundamental principles underlying the treatment of infection have been known and practiced for a long time. These two cardinal principles—adequate drainage and rest—are as true and important today as they were in the earliest days of surgery.

Table 1.—*Acute Suppurative Arthritis*

Eight Cases Incision and Drainage Followed by Salt Pool Treatment	
Joint involved	Knee 5 cases; Hip 2 cases; Ankle 1 case
Sex	Male 6; Female 2
Average age	6½ years
Invading organism	Negative culture 2; Streptococcus 4; Staphylococcus aureus 2
Time required for wound to heal	2.8 months
Return of motion	Complete
Time required to obtain motion	5 months

The practical application of these principles in the treatment of osteomyelitis is best exemplified in the Winnett Orr treatment. When meticulously carried out, this method not only satisfies the two prime tenets of adequate drainage and rest, both local to the diseased part and general rest of the patient, but it also prevents contamination from frequent dressings. I think it may be said without much fear of contradiction that the Orr treatment has given on the whole to surgeons over the country a degree of success that has not been approached by any other form of treatment.

In spite of the above statement, I believe that this treatment has definite shortcomings in certain types of cases. When the infective process is in close proximity to the major joints, especially when located at the distal end of the femur or near the elbow joint, and more particularly if there is an accompanying suppurative arthritis of the neighboring joint, then one of our main problems in treating this patient is to preserve for him as much joint motion as possible. Restoration of motion in a pus-ridden joint is not best accomplished by a long period of immobilization in plaster casts.

It is in support of this contention that the salt water pool treatment of bone and joint infections is here described. While we have used this treatment in over a hundred cases of osteomyelitis, this paper is concerned only with suppurative arthritis and osteomyelitis in which adjacent joints are also involved, or when the diseased process closely encroaches upon joint structures. It is in these particular types of cases, in which preservation of joint motion is one of the vital issues, that the salt-pool treatment has its greatest field of usefulness.

ACUTE SUPPURATIVE ARTHRITIS

It was first shown by Willems during the World War, and it has been thoroughly substantiated since, that regeneration of pus-ridden joints and restoration of function are best accomplished by early evacuation and motion.

Motion of an infected joint should not create muscle spasm. It should be painless and free of the fear of pain, and there should be no discomfort

* From the clinics of the Orthopedic Hospital, Los Angeles.

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in the joint after the patient returns to bed. The use of the salt pool satisfies all these requirements, and these requirements are especially important when treating children. Motion in the water mechanically cleans away the infection, and because the water is hypertonic, there exists an osmotic pressure between this fluid and the body fluids, so that drainage is encouraged and accelerated from the innermost depths of the wound.

The salt concentration of the water in the pool is between 6 and 7 per cent, approximately the same strength as sea water. At this concentration the water sterilizes itself and cultures have always been negative. The temperature of the pool is maintained at about 96 degrees and the treatment lasts about thirty minutes. The floor of the pool should be sloping so that weight bearing on an infected joint can be gradually increased. As you know, the weight of the body standing in water is the weight of the body above the water line.

In this series there were eight cases of suppurative arthritis without bone involvement. In five the infection was in the knee, two in the hip, and one in the ankle. The average time required for healing was two and eight-tenths months, and complete motion was restored in every case in an average of five months.

In these cases the joint is incised widely and irrigated with several gallons of warm normal saline solution. The part is splinted for two or three days, and then the patient is put in the salt pool daily.

From these cases, and from the reports of other surgeons, it seems definitely established that acute joint infections, especially in children, respond well to early drainage and motion. By all odds, the best and most painless way to carry out this motion is by means of the salt pool.

ACUTE OSTEOMYELITIS WITH SUPPURATION OF THE ADJACENT JOINT

We will now consider those cases of osteomyelitis involving the ends of long bones, and in which there is an accompanying suppurative arthritis.

With this type of case it has been our routine to do a wide saucerization of the bone, removing as much of the diseased bone as possible, and pack the wound lightly with vaseline gauze as in the Orr treatment. The joint is also opened and irrigated. A plaster cast or spica is applied, depending on the bone involved.

TABLE 2.—*Acute Osteomyelitis with Suppurative Arthritis*

Twelve Cases	
Joint involved (and adjacent bone)	Hip 6 cases; Knee 3 cases; Ankle 2 cases; Elbow 1 case
Sex	Male 9; Female 3
Average age	10.5 years
Invading organism	Staphylococcus aureus 7 cases; Staphylococcus albus 1 case; Streptococcus 2 cases; Not recorded 2 cases
Average time wounds drained	16 months
Return of motion	3 cases—complete; 5 cases—averaged one-half normal; 4 cases—ankylosis

TABLE 3.—*Acute Osteomyelitis in Close Proximity to Joints*

Ten Cases	
Bone involved (close approximation to joint)	Distal end of femur 5 cases; Neck of femur 1 case; Proximal end of tibia 1 case; Distal end tibia 1 case; Entire humerus 1 case; Entire radius 1 case
Sex	Male 8; Female 2
Average age	12.7 years
Invading organism	Staphylococcus aureus 7 cases; Staphylococcus albus 1 case; Streptococcus 1 case; Not recorded 1 case
Average time wound drained	7.5 months
Return of motion	7 joints—Complete; 6 joints—One-half normal

The cast is removed in four to six weeks, which is about the time the first change of cast is made in the Orr treatment. A splint is applied and daily pool treatment started.

While motion at this early stage would seem a violation of the principle of rest, still the motion permitted in the pool is not such a violation of this tenet, as might be presumed. The buoyancy of the salt water, removing the gravity load, permits motion without pain or muscle spasm, and the part is splinted between treatments or even during treatment within the first week or so. Almost without exception the patient will state that the extremity feels better after his pool treatment.

There is another advantage of this form of treatment, especially in older patients. Remaining idle in bed for months in an ill-smelling cast does not appeal to some patients, particularly the more fastidious. In the pool the patient can daily watch the improvement of motion in the stiff joints and can see the wounds become smaller and cleaner. Certainly, a psychic appeal that is more than imaginary.

In this series there were twelve cases in which there was an osteomyelitis with suppuration of the adjoining joint. The return of motion in such cases, naturally, is not as great as in those in which there is no bone involvement.

The hip and ankle show more tendency to heal with motion while the knee and elbow have greater tendency to heal with ankylosis.

In the six hip cases, there was complete return of motion in two, and ankylosis in one; and in the remaining three the end-result was motion, varying from one-half to two-thirds normal.

In the three knee cases, one had a return of motion two-thirds of normal, and the other two ended in complete bony ankylosis; but it is only fair to state that one of these patients came to surgery late, and after there was considerable joint

dissolution and bone destruction in both the lower end of the femur and the upper end of the tibia. In such cases, experience has shown that joint motion is doomed, and it is better to proceed with the Orr treatment rather than attempting to gain motion.

There were two ankle cases. In one there was complete return of motion, and in the other the range of motion was one-third normal.

One elbow case resulted in complete fusion.

In those cases in which there is an osteomyelitis of the head and neck of the femur with a purulent empyema of the hip joint, the leg is immobilized for several months in plaster before pool treatment is started. In these hips the head of the femur usually becomes a sequestrum which requires surgical removal. Maintaining the remains of the neck in the acetabulum is the problem of first consideration. Adequate motion will develop later; and if one is successful in preventing the neck dislocating upward, a good stable hip will result that will stand up under ordinary use, and usually with motion of at least half-normal range.

OSTEOMYELITIS IN WHICH THE DISEASE PROCESS CLOSELY ENCROACHES UPON JOINT STRUCTURE

We come now to the third type of case in which the salt pool treatment is especially useful. These are the cases in which the osteomyelitic process, while not involving the joint proper, yet lies in very close approximation to the joint, involving at times the epiphyseal plate.

Some joints, like the elbow, but particularly the knee, tend to heal with considerable restriction of motion if they are long immobilized. Drainage for months about the knee, especially from the distal end of the femur, causes a plastering down of the vasti and rectus femoris muscles to the femur, and with this there occurs a thickening and shortening of the capsule of the knee, a condition which is aggravated by immobilization and minimized by early motion.

In this series there was an osteomyelitis near the ends of ten of the long bones, the diseased process being in close approximation to thirteen joints.

Since the joint itself was not involved, naturally, a greater return of motion could be expected than in the series described just above.

Of the thirteen joints, there was complete return of motion in seven, and in the other six the residual motion averaged about one-half normal.

I do not wish to give the impression that the salt pool has solved the problem of the treatment of osteomyelitis and suppurative joints, but I am convinced that in the selected type of cases as above described, it will give an end-result that cannot be duplicated by other methods.

SUMMARY

1. Thirty cases of acute suppurative arthritis and osteomyelitis with joint involvement, treated by surgical drainage followed by early motion in the salt-water pool, are presented.

2. In the eight acute suppurative arthritis cases without bone involvement, there was complete return of motion in all cases in an average of five months' time.

3. In the twenty-two cases of osteomyelitis with concurrent purulent infection of the neighboring joint and osteomyelitis closely encroaching upon joint structure, there was a gratifying return of joint motion in most instances.

4. The salt-pool treatment permits early motion without muscle spasm, pain or the fear of pain, and thus does not violate the principle of rest that is so essential in the treatment of any infection.

5. Motion of joints in the salt water not only mechanically washes away the pus, but, because it is a hypertonic solution, there is an osmosis outward of the tissue fluids which causes a thorough cleansing of the wound from its innermost depths.

3523 West Twelfth Street.

DISCUSSION

FRANCIS M. MCKEEVER, M. D. (1136 West Sixth Street, Los Angeles).—Doctor Brockway's statistics are very impressive. Particularly striking are his results with those patients in whom a primary osteomyelitis has ruptured into a joint.

The acute suppurative arthritis in which only synovial membrane is infected, with timely adequate drainage as a rule recovers sufficient motion so that no marked permanent disability results. The joint infected by the extension of an osteomyelitis through its articular cartilage is a much more discouraging situation which, altogether too often culminates in a complete ankylosis or a few degrees of painful, useless motion after a long exhaustive illness.

Doctor Brockway has mentioned adequate drainage of both the infected bone focus and of the joint. He has stressed early mobilization in a hypertonic saline medium.

The percentage of recovery of motion which he has mentioned is indeed excellent, and certainly warrants consideration of the saline pool as a valuable adjunct in the postoperative treatment of this type of case.

I feel, however, that a little more emphasis should be laid on the early diagnosis of the extension of the infection into the joint cavity, and the timely dual drainage of both the infected bone and the invaded joint, if articular cartilage is to be saved from the ravages of the products of inflammation.

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FREDERIC C. BOST, M. D. (384 Post Street, San Francisco).—Doctor Brockway's paper is of real value. He has demonstrated by his splendid results the efficacy of hypertonic saline baths. No group of cases cause us more concern than those with which Doctor Brockway's paper has dealt, and any method of treatment that offers such hopeful progress is most welcome to all of us.

The physiologic basis for hypertonic saline baths to me seems a most logical one. The end-results, here presented, give clinical proof to this point. The physical side of this treatment might at first seem to make it impractical to most of us. However, all that is necessary is a bathtub, warm water and a sack of salt, and certainly we can all provide such accessories.

Since learning of Doctor Brockway's work, I have had the opportunity to use the salt-water treatment in several cases, and I can attest to the validity of his statements concerning the improvement in general condition, the relief from pain, and the marked enthusiasm on the part of the patient so treated. The rapidity with which dirty, sluggish wounds take on new life and cleanliness is remarkable. Limited use of this form of therapy will, I believe, serve to convince most of us that there is no better method for treating a septic joint.

We have all seen osteomyelitis, either with or without joint involvement, progress favorably for a limited period of time only to reach a stage of extreme sluggishness, which usually bespeaks a long and discouraging period of

chronicity. Doctor Brockway's method of handling these cases by the use of stimulating saline baths is to me a most excellent one.

SAMUEL S. MATHEW, M. D. (1913 Wilshire Medical Building, Los Angeles).—Doctor Brockway's results in the treatment of suppurative arthritis without bone involvement, by means of salt water pool treatment, are indeed gratifying. Just what part the pool treatment itself played in these excellent results is, however, hard to estimate. It has been my feeling that the prognosis for return of motion in an involved joint depends, to a great extent, on the organism present and what destruction has already taken place in reference to the articular cartilage. We often see, particularly in children, those cases in which the knee is swollen, with moderate amount of local heat, and associated with but little constitutional reaction. On incising such joints and thoroughly washing them out with large quantities of normal warm saline solution, the prognosis is good for full return of motion, the motion itself being started as the local symptoms subside. Then there are such cases where the invading organism is far more destructive and there has been a greater change in the joint, primarily due to delayed drainage. Our prognosis here is poor for return of normal function, regardless of our after-care. I have always felt that in either case active motion should not be started until local symptoms have subsided, because we are dealing with a diseased joint which should be kept at rest during its acute stage. Doctor Brockway has suggested an easy method of starting early motion by pool treatment, but he has emphasized that such early motion should be done without causing muscle spasm or pain. What importance we can place upon the use of salt water in such pool treatment I cannot state, because I feel that motion should not be started until, as I save said, the disease process has quieted down sufficiently.

CAN THE STATE EXAMINE PEOPLE ENTERING THE STATE WHO MAY BE SUSPECTED OF HAVING AN INFECTIOUS DISEASE?

OPINION OF THE ATTORNEY-GENERAL OF CALIFORNIA: IN RESPONSE TO REQUEST FROM STATE BOARD OF HEALTH

In the January issue of CALIFORNIA AND WESTERN MEDICINE, editorial comment was made on "Indigent Camps in California: A New and Pressing Problem." (See page 2 of January CALIFORNIA AND WESTERN MEDICINE and also comment in this number, on page 146.)

The opinion rendered by Attorney-General U. S. Webb and Deputy Attorney-General Leon French contains much general and specific information of interest to members of the medical profession, and is, therefore, printed in full.

STATE OF CALIFORNIA
LEGAL DEPARTMENT

San Francisco, February 10, 1937.

Honorable Walter M. Dickie
Director, Department of Public Health
San Francisco, California

Dear Sir:

I have before me your communication under date of October 27, 1936, which is as follows:

It has been estimated that during the last two years somewhere in the neighborhood of 200,000 itinerant people have moved into California from the middle-western states and are now located in itinerant camps and government resettlement camps in the State of California. Many of these people are suffering from infectious diseases, namely, tuberculosis, trachoma, dysentery, typhoid fever, etc., all of which are a menace to the people of the State of California, for the reason that these migratory people are not entitled to institutional nor medical care in the counties in which they are located, because of lack of residence.

In order that this condition may not be continued indefinitely, I would respectfully request the following opinion: Does the State Department of Public Health have the right under the law to examine people entering the State who may be suspected of having an infectious disease? If they have not sufficient funds to provide proper institutional or hospital care, can they be denied permission to enter the State?

There is on the statutes, as you know, "an Act to prevent introduction of contagious diseases into the State," approved March 15, 1883, but this refers only to train service, I believe.

As the questions which you submit are of major importance not only to the people of the State of California but also to the individuals coming to the State of California from other states, such questions have been given very careful and detailed consideration, particularly in view of the fact that, so far as the reports indicate, these questions have not received a definite determination by any court of last resort in this state. The question of exclusion was, however, considered in the case of *State* vs. *S. S. "Constitution,"* 42 Cal. 578, to which reference is hereafter made.

Perhaps the most enlightening cases to be found upon the subject of your communication are the so-called "Passenger Cases," decided by the Supreme Court of the United States at the January term in 1849 and reported in the seventh volume of Howard's Reports (48 U. S.) at page 283. The Passenger Cases were two kindred cases argued together before the United States Supreme Court, entitled, respectively, *Norris* vs. *The City of Boston* and *Smith* vs. *Turner*. They involved acts of the State of Massachusetts and the State of New York, respectively, relating particularly to the admission within their boundaries of passengers arriving by water at the ports thereof.

Each of the Passenger Cases was argued no less than three times before the Supreme Court of the United States, finally resulting in a decision by a bare majority of the nine justices declaring both the act of the State of Massachusetts and that of the State of New York unconstitutional and, therefore, void because of imposing a burden or regulation upon "commerce with foreign nations, and among the several states, . . ."

(Article I, Section 8, United States Constitution.)

However, in spite of such full argument and careful and lengthy consideration, there was no opinion of the court, as a court, filed in either of these cases. Each of the nine justices, with the exception of Mr. Justice Nelson, filed a lengthy opinion, and Mr. Justice Nelson expressly concurred not only in the conclusions but in the grounds and principles set forth at length in the dissenting opinion of Mr. Chief Justice Taney.

Throughout the report of these cases—covering some 290 pages—are found many and repeated expressions, both in the arguments and in nearly all of the opinions, expressly setting forth and maintaining the right of a state, under its retained police power, to exclude from its boundaries persons arriving thereat from either foreign countries or sister states within the Union where such exclusion was clearly based upon the retained police power and was clearly for the purpose of guarding against the introduction of any thing or person which might corrupt the morals or endanger the health or lives of the citizens of the excluding state.

Upon this principle the report of the "Passenger Cases," *supra,* indicates that every one of the eminent counsel engaged in the argument thereof, as well as every one of the nine justices of the Supreme Court of the United States, concurred.

A few of the many statements found in the opinions of the several justices, and which appear most clearly and definitely in point, will be quoted. For example: Mr. Justice McLean said (page 400):

In giving the commercial power to Congress, the States did not part with that power of self-preservation which must be inherent in every organized community. They may guard against the introduction of anything which may corrupt the morals, or endanger the health or lives of their citizens. Quarantine or health laws have been passed by the states, and regulations of police for their protection and welfare.